

Listing of Claims

The below listing of claims will replace all prior versions of claims in the application.

Claims 1-24: Cancelled:

25. (New) An image sensor, comprising:

a sensor array comprising a two-dimensional array of photodetectors and a plurality of analog-to-digital (A/D) converters forming a two-dimensional array of pixel elements, each pixel element comprising a photodetector and at least a portion of an A/D converter, each of the pixel elements outputting digital signals as pixel data representing an image of a scene, wherein each A/D converter in the sensor array is connected to a group of at least two neighboring photodetectors for receiving analog output signals from the group of photodetectors, each A/D converter multiplexing between the photodetectors in the group to convert the analog output signals of the photodetectors into digital signals as the pixel data associated with the photodetectors;

each group of photodetectors connected to an A/D converter comprising a first photodetector having a first sensitivity level and a second photodetector having a second sensitivity level, all of the first photodetectors in the sensor array forming a first set of photodetectors having the first sensitivity level and all of the second photodetectors in the sensor array forming a second set of photodetectors having the second sensitivity level;

wherein the first set of photodetectors having the first sensitivity level generates the analog output signals after a first exposure time and the second set of photodetectors having the second sensitivity level generates the analog output signals after a second exposure time different than the first exposure time, the first exposure time and the second exposure time being within a snapshot of the scene; and the A/D converters multiplex between the first and second photodetectors in the groups according to the first and second exposure times.

26. (New) The image sensor of claim 25, wherein the second sensitivity level is lower than the first sensitivity level and the second exposure time is longer than the first exposure time.

27. (New) The image sensor of claim 25, wherein the first set of photodetectors is disposed to capture a first color spectrum of visible light and the second set of photodetectors is disposed to capture a second and different color spectrum of visible light.

28. (New) The image sensor of claim 27, further comprising:

a two dimensional array of selectively transmissive filters superimposed and in registration with each of the pixel elements, the array of selectively transmissive filters includes a first set of filters associated with the first set of photodetectors for capturing the first color spectrum of visible light and a second set of filters associated with the second set of photodetectors for capturing the second color spectrum of visible light.

29. (New) The image sensor of claim 28, wherein each group of photodetectors connected to an A/D converter further comprises a third photodetector having a third sensitivity level, all of the third photodetectors in the sensor array forming a third set of photodetectors having the third sensitivity level, the third set of photodetectors generating the analog output signals after a third exposure time different than the first and the second exposure times.

30. (New) The image sensor of claim 29, wherein the first, second and third set of photodetectors are disposed to capture a red, green and blue color spectrum respectively.

31. (New) The image sensor of claim 29, wherein the first, second and third groups of photodetectors are disposed to capture a cyan, magenta and yellow color spectrum respectively.

32. (New) An image sensor, comprising:

a sensor array comprising a two-dimensional array of photodetectors and a plurality of analog-to-digital (A/D) converters forming a two-dimensional array of pixel elements, each pixel element comprising a photodetector and at least a portion of an A/D converter, each of the pixel elements outputting digital signals as pixel data representing an image of a scene, the sensor array generating multiple representations of the image at a plurality of exposure times,

wherein each A/D converter in the sensor array is connected to a group of at least two neighboring photodetectors for receiving analog output signals from the group of photodetectors, each A/D converter multiplexing between the photodetectors

in the group to convert the analog output signals of the photodetectors into digital signals as the pixel data associated with the photodetectors;

each group of photodetectors connected to an A/D converter comprising a first photodetector having a first sensitivity level and a second photodetector having a second sensitivity level, all of the first photodetectors in the sensor array forming a first set of photodetectors having the first sensitivity level and all of the second photodetectors in the sensor array forming a second set of photodetectors having the second sensitivity level;

a data memory, in communication with the sensor array, for storing a time index value and the pixel data for each of the pixel elements, the time index value indicating one of the plurality of exposure times in which the pixel data exceeds a predetermined threshold level and for which the pixel data is stored,

wherein the plurality of exposure times comprises a first set of exposure times and a second set of exposure times, the first set of photodetectors generates the multiple representations of the image at the first set of exposure times, and the second set of photodetectors generates the multiple representations of the image at the second set of exposure times, the first set of exposure times and the second set of exposure times being within a snapshot of the scene and the first set of exposure times including at least one exposure time different than the second set of exposure times; and the A/D converters multiplex between the first and second photodetectors in the groups according to the first and second sets of exposure times.

33. (New) The image sensor of claim 32, wherein the data memory further stores a threshold indicator value for each of the pixel elements indicating whether the pixel data for each of the pixel elements has exceeded the predetermined threshold level.

34. (New) The image sensor of claim 32, wherein the second sensitivity level is lower than the first sensitivity level, and a last exposure time in the second set of exposure times is longer than a last exposure time of the first set of exposure times.

35. (New) The image sensor of claim 32, wherein the first set of photodetectors is disposed to capture a first color spectrum of visible light and the second set of photodetectors is disposed to capture a second and different color spectrum of visible light.

36. (New) The image sensor of claim 35, further comprising:

a two dimensional array of selectively transmissive filters superimposed and in registration with each of the pixel elements in the sensor array, the array of selectively transmissive filters includes a first set of filters associated with the first set of photodetectors for capturing the first color spectrum of visible light and a second set of filters associated with the second set of photodetectors for capturing the second color spectrum of visible light.

37. (New) The image sensor of claim 32, wherein the exposure times within the first set of exposure times are spaced apart in a non-linear manner.

38. (New) The image sensor of claim 32, wherein the exposure times within the second set of exposure times are spaced apart in a non-linear manner.